TROPICAL ATMOSPHERE-OCEAN (TAO) PROGRAM FINAL CRUISE REPORT RB-15-02

Area: Equatorial Pacific: 8°S 125°W to 8°N 125°W and 8°S 140°W to 8°N 140°W

Itinerary:

RB-15-02 DEP February 22, 2015, San Diego, CA

ARR April 7, 2015, Papeete, FP

CRUISE DESCRIPTION

The Tropical Atmosphere Ocean (TAO) array consists of 70 buoys utilizing a taut line mooring configuration used to mount data collection sensors for climate research purposes. Fifteen buoys are serviced by JAMSTEC and the remaining 55 buoys from 95°W longitude to 165°E longitude are serviced by National Data Buoy Center (NDBC). Repair and maintenance of the buoys is performed by NDBC contracted personnel on an annual basis utilizing the NOAA Ships and other contract vessels. The buoys' deployment lifecycles are up to 18 months to ensure at least one year of data collection can be completed.

NDBC Points of Contact

NDBC Operations Branch Chief NDBC Operations Manager

Steve Cucullu Jeff Jenner

National Data Buoy Center National Data Buoy Center

Building 3205 Building 3205

Stennis Space Center, MS 39529 Stennis Space Center, MS 39529

228-688-3804 228-688-2784

Email: stephen.cucullu@noaa.gov
Email: jeff.jenner@noaa.gov

TAO Cruise Objective and Plan:

The objective of this cruise was the maintenance of the TAO Array along the 125°W and 140°W meridians.

The scientific complement for the cruise embarked at San Diego, CA on February 21, 2015. The ship departed on February 22, 2015 and conducted operations as listed in Section 2.1. The ship arrived at Papeete, Tahiti on April 7, 2015.

1.0 **PERSONNEL**

1.1 <u>CRUISE LEAD AND PARTICIPATING SCIENTISTS</u>:

<u>Cruise Lead</u>: William Thompson.

Participating Scientists:

Name	Gender	Nationality	Affiliation
William Thompson	M	US	NOAA/NDBC
Stephan Becerra	M	US	NOAA/NDBC
Casey Burge	M	US	NOAA/NDBC

2.0 **OPERATIONS**

2.1 <u>TAO Data Recovery Summary</u>

Mooring Operations conducted are shown in the tables below. The following provides details on the data recovery efforts for the buoys serviced. All noted times in this summary report are Coordinated Universal Time (UTC):

TAO Cruise Summary

Buoy Site: 8N 125W				
Mooring Operation: Recovery		Moori	Mooring ID#: DM083A	
Deployed Location: 08-02.95N/124-59.22W		Deploy	Deployed Date: 9/2/2014	
Recovered Location: (Recovered Location: 08-1.76N/125 0.83W		Recovered Date: 3/5/2015	
Sensors/Equipment L	ost at Sea: TP500			
Sensors Damaged/Fou	ıled: None			
Fishing/Vandalism: N	Fishing/Vandalism: None			
General Comments: None				
Site Sensor Failures	Site Sensor Failures Date Data Flagged Why Data Flagged Field Service			
Observations				Observations
SST/SSS	3/1/15	Data mis	sing	None
TP500	9/3/14	Data mis	sing	Lost at Sea

Buoy Site: 8N 125W	Mooring Depth: 4654 m		
Mooring Operation: Deployment	Mooring ID#: DM114A		
Deployed Location: 08-02.16N/125-00.57W	Deployed Date: 3/5/2015		
Pre-Deployment On Deck Instrument Failures: None			
Sensors/Equipment Lost at Sea: None			
Sensors Damaged During Deployment: None			
General Comments: Dropped anchor early due to ship propulsion issue.			

Buoy Site: 5N 125W				
Mooring Operation: Recovery Mooring ID#: DM084A			84A	
Deployed Location: 05	5-04.29 N/124-55.7 W	Deployed Date: 9/4/	2014	
Recovered Location: (Recovered Location: 05-4.53 N/124 56.51 W Recovered Date: 3/6/2015			
Sensors/Equipment Lo	ost at Sea: None			
Sensors Damaged/Fouled: T120 & T140 slid down Nilspin to 140 m and 180 m respectively.				
Fishing/Vandalism: None				
General Comments: Acoustic Release did not respond, but was recovered.				
Site Sensor Failures Date Data Flagged Why Data Flagged Field Service				
			Observations	
None				

Buoy Site: 5N 125W	Mooring Depth: 4408 m	
Mooring Operation: Deployment	Mooring ID#: DM115A	
Deployed Location: 05-04.70N/125-57.30W	Deployed Date: 3/6/2015	
Pre-Deployment On Deck Instrument Failures: None		
Sensors/Equipment Lost at Sea: None		
Sensors Damaged During Deployment: None		
General Comments: None		

Buoy Site: 2N 125W			
Mooring Operation: Recovery	Mooring ID#: DM085A		
Deployed Location: 01-57.87N/125-04.43W	Deployed Date: 9/5/2014		
Recovered Location: 01-57.55N/125-04.26W	Recovered Date: 3/7/2015		
Sensors/Equipment Lost at Sea: None			
Sensors Damaged/Fouled: None			
Fishing/Vandalism: None			
General Comments: Camera system was recovered in fair condition, but was being held on to			
by the connector only. T40, 60, & 80 slid down Nilsping to 80 m and 100 m respectively.			
Site Sensor Failures Data Flagged	Why Data Flagged Field Service		

			Observations
ATRH	11/5/14	Data excessively high	None

Buoy Site: 2N 125W	Mooring Depth: 4717 m	
Mooring Operation: Deployment	Mooring ID#: DM116A	
Deployed Location: 01-57.54N/125-05.18W	Deployed Date: 3/8/2015	
Pre-Deployment On Deck Instrument Failures: None		
Sensors/Equipment Lost at Sea: None		
Sensors Damaged During Deployment: None		
General Comments: None		

Buoy Site: 0 125W CO2				
Mooring Operation: Recovery		Mooring ID#: DM(Mooring ID#: DM086A	
Deployed Location: 0	0-10.18S/124 23.23W	Deployed Date: 9/6	Deployed Date: 9/6/2014	
Recovered Location:	00-11.45S/124 22.13W	Recovered Date: 3/	Recovered Date: 3/8/2015	
Sensors/Equipment L	ost at Sea: None			
Sensors Damaged/Fou	ıled: None			
Fishing/Vandalism: N	Fishing/Vandalism: None			
General Comments: Upper wind stanchion was flopping around. No cotter key, hose clamps				
were loose.				
Site Sensor Failures	Date Data Flagged	Why Data Flagged	Field Service	
			Observations	
Wind Direction	1/8/15	Data offset	Wind stanchion	
			flopping around	

Buoy Site: 0 125W CO2	Mooring Depth: 4796M	
Mooring Operation: Deployment	Mooring ID#: DM117A	
Deployed Location: 00-11.08S/125 22.85W	Deployed Date: 3/9/2015	
Pre-Deployment On Deck Instrument Failures: None		
Sensors/Equipment Lost at Sea: None		
Sensors Damaged During Deployment: None		
General Comments: None		

Buoy Site: 2S 125W	
Mooring Operation: Recovery	Mooring ID#: DM087A
Deployed Location: 02-03.63S/124 55.06W	Deployed Date: 9/7/2014
Recovered Location: 02-00.88S/124 55.26W	Recovered Date: 3/10/2015

Sensors/Equipment L	ost at Sea: None				
Sensors Damaged/Fou	Sensors Damaged/Fouled: None				
Fishing/Vandalism: N	Vone				
General Comments: None					
Site Sensor Failures	Date Data Flagged	Why Data Flagged	Field Service		
			Observations		
None					

Buoy Site: 2S 125W	Mooring Depth: 4695 m		
Mooring Operation: Deployment	Mooring ID#: DM118A		
Deployed Location: 02-04.25S/125-55.97W	Deployed Date: 3/10/2015		
Pre-Deployment On Deck Instrument Failures: None			
Sensors/Equipment Lost at Sea: None			
Sensors Damaged During Deployment: None			
General Comments: None			

Buoy Site: 5S 125W				
Mooring Operation: I	Mooring Operation: Recovery		088A	
Deployed Location: 0	5-01.60S/124 55.11W	Deployed Date: 9/8	3/2014	
Recovered Location:	05-02.2S/124-54.83W	Recovered Date: 3 /	/11/2015	
Sensors/Equipment L	ost at Sea: None			
Sensors Damaged/For	ıled: None			
Fishing/Vandalism: 1	None			
General Comments: I	Release was horizontal uj	pon arrival		
Site Sensor Failures	Date Data Flagged	Why Data Flagged	Field Service	
			Observations	
T20	3/5/15	Data dropped	Sensor slid down to	
			40m	
T140	2/5/15	Data dropped	Sensor slid down to	
			180m	
T180	1/21/15	Data dropped	Sensor slid down to	
			250m	

Buoy Site: 5S 125W	Mooring Depth: 4547 m		
Mooring Operation: Deployment	Mooring ID#: DM119A		
Deployed Location: 05-01.68S/124 56.31W	Deployed Date: 3/11/2015		
Pre-Deployment On Deck Instrument Failures: None			
Sensors/Equipment Lost at Sea: None			
Sensors Damaged During Deployment: None			

General Comments: None

Buoy Site: 8S 125W				
Mooring Operation: Recovery		Mooring ID#: DM(Mooring ID#: DM089A	
Deployed Location: 0'	7-59.14S/124-58.91W	Deployed Date: 9/9)/2014	
Recovered Location: (07-59.15S/124-58.50W	Recovered Date: 3/	/12/2015	
Sensors/Equipment L	ost at Sea: None			
Sensors Damaged/Fou	ıled: None			
Fishing/Vandalism: N	Vone			
General Comments: T	Top section cable smashe	d at connection; top sect	tion was twisted. T20,	
40, 80, 100, & TP 300	Slid down Nilspin.			
Site Sensor Failures	Date Data Flagged	Why Data Flagged	Field Service	
			Observations	
T40	3/11/15	Data dropped	Slid to 60m	
T100	1/28/15	Data dropped	Slid to 120m	
T80	1/21/15	Data dropped	Slid to 100m	
TP300	12/5/14	Slid to 500m		
Wind	10/26/14	0/26/14 Dropped to zero Stanchion gone, wire		
			hanging out	
T20	9/25/14	Data dropped	Slid to 40m	

Buoy Site: 8S 125W	Mooring Depth: 4520 m		
Mooring Operation: Deployment	Mooring ID#: DM120A		
Deployed Location: 07-59.04S/124-59.22W	Deployed Date: 3/12/2015		
Pre-Deployment On Deck Instrument Failures: None			
Sensors/Equipment Lost at Sea: None			
Sensors Damaged During Deployment: None			
General Comments: None			

Buoy Site: 9N 140W					
Mooring Operation: F	Mooring Operation: Recovery Mooring ID#: DM094A				
Deployed Location: 08	Deployed Location: 08-59.80N/140-15.21W Deployed Date: 9/21/2014				
Recovered Location: (Recovered Location: 08-58.8N/140-15.48W Recovered Date: 3/18/2015				
Sensors/Equipment Lost at Sea: None					
Sensors Damaged/Fouled: None					
Fishing/Vandalism: None					
General Comments: None					
Site Sensor Failures	ite Sensor Failures Date Data Flagged Why Data Flagged Field Service				
Observations					

None		

Buoy Site: 9N 140W	Mooring Depth: 4834 m		
Mooring Operation: Deployment	Mooring ID#: DM121A		
Deployed Location: 09-00.02N/140-15.47W	Deployed Date: 3/18/2015		
Pre-Deployment On Deck Instrument Failures: None			
Sensors/Equipment Lost at Sea: None			
Sensors Damaged During Deployment: None			
General Comments: None			

Buoy Site: 5N 140W	Mooring Depth: 4467 m		
Mooring Operation: Deployment	Mooring ID#: DM122A		
Deployed Location: 05-01.82N/139-58.75W	Deployed Date: 3/20/2015		
Pre-Deployment On Deck Instrument Failures: None			
Sensors/Equipment Lost at Sea: None			
Sensors Damaged During Deployment: None			
General Comments: None			

Buoy Site: 2N 140W					
Mooring Operation: F	Mooring Operation: Recovery Mooring ID#: DM093A				
Deployed Location: 01	1-58.55N/140-02.04W	Deployed Date: 9/1	8/2014		
Recovered Location: (Recovered Location: 01-58.75N/140-01.68W Recovered Date: 3/21/2015				
Sensors/Equipment L	ost at Sea: None				
Sensors Damaged/Fou	iled: None				
Fishing/Vandalism: None					
Sensors/Tubes Downloaded: None					
General Comments: None					
Site Sensor Failures Date Data Flagged Why Data Flagged Field Service					
Observations					
None					

Buoy Site: 2N 140W	Mooring Depth: 4370 m		
Mooring Operation: Deployment	Mooring ID#: DM123A		
Deployed Location: 01-58.8N/140 01.7W	Deployed Date: 3/22/2015		
Pre-Deployment On Deck Instrument Failures: None			
Sensors/Equipment Lost at Sea: None			
Sensors Damaged During Deployment: None			

General Comments: None

Buoy Site: 0 140W Flux/CO2				
Mooring Operation: Recovery Mooring ID#: DM092A		92A		
Deployed Location: 00	Deployed Location: 00-01.65N/139-56.00W		Deployed Date: 9/16/2014	
Recovered Location: 00-02.06N/139-54.78W Recovered Date: 3/		Recovered Date: 3/2	22/2015	
Sensors/Equipment L	ost at Sea: None			
Sensors Damaged/Fou	Sensors Damaged/Fouled: None			
Fishing/Vandalism: N	Fishing/Vandalism: None			
General Comments: None				
Site Sensor Failures	Site Sensor Failures Date Data Flagged Why Data Flagged Field Service			Field Service
Observations				Observations
TP500 9/19/14 I		D	ata indicated sensor	Sensor slid down to
s			ippage.	700m

Buoy Site: 0 140W Flux/CO2	Mooring Depth: 4361 m			
Mooring Operation: Deployment	Mooring ID#: DM124A			
Deployed Location: 00-01.56N/139-55.95W	Deployed Date: 3/23/2015			
Pre-Deployment On Deck Instrument Failures: None				
Sensors/Equipment Lost at Sea: None				
Sensors Damaged During Deployment: None				
General Comments: None				

Buoy Site: 0 140W ADCP				
Mooring Operation: R	Mooring Operation: Recovery Mooring ID#: CA018			
Deployed Location: 00	oyed Location: 00-02.370N/140-02.262W			
Recovered Location: (00-02.37N/140-02.26W	Recovered Date: 3	/23/2015	
Sensors/Equipment L	ost at Sea: None			
Sensors Damaged/Fou	lled: RF Beacon damage	d and flooded		
Fishing/Vandalism: N	Fishing/Vandalism: None			
General Comments: N	Vone			
Site Sensor Failures Date Data Flagged Why Data Flagged Field Service				
	Observations			
None				

Buoy Site: 0 140W ADCP	Mooring Depth: 4316 m
Mooring Operation: Deployment	Mooring ID#: CA019

Deployed Location: 00-01.995N/140-01.748W	Deployed Date: 3/23/2015		
Pre-Deployment On Deck Instrument Failures: None			
Sensors/Equipment Lost at Sea: None			
Sensors Damaged During Deployment: None			
General Comments: 3 m chain added above anchor to make mooring length.			

Buoy Site: 2S 140W Refresh				
Mooring Operation: R	Mooring Operation: Recovery Mooring ID#: DM091A			
Deployed Location: 02	2-02.77S/140 00.71W	Deployed Date: 9/14	1/2014	
Recovered Location: ()2-01.95S/139 59.51W	Recovered Date: 3/2	24/2015	
Sensors/Equipment Lo	ost at Sea: Anemometer			
Sensors Damaged/Fou	led: SSC connector brok	en		
Fishing/Vandalism: Lo	ong line wrapped around	Nilspin and trailing off.	Wind stanchion	
snapped off at the weak	snapped off at the weak spot, anemometer missing. Paint scrapes on hull.			
General Comments: N	General Comments: None			
Site Sensor Failures	Date Data Flagged	Why Data Flagged	Field Service	
			Observations	
Winds	Winds 2/11/15 Data failed. Sensor lost. Upper			
		Suspected vandalism	stanchion gone. Cable	
event. ripped out of bird.				
RH	12/14/14	Data failed.	None.	

Buoy Site: 2S 140W	Mooring Depth: 4320 m			
Mooring Operation: Deployment	Mooring ID#: DM125A			
Deployed Location: 02-01.66S/140 01.09W	Deployed Date: 3/24/2015			
Pre-Deployment On Deck Instrument Failures: None				
Sensors/Equipment Lost at Sea: None				
Sensors Damaged During Deployment: None				
General Comments: None				

Buoy Site: 5S 140W					
Mooring Operation: R	ion: Recovery Mooring ID#: DM090A				
Deployed Location: 05	Deployed Location: 05-00.79S/139 54.25W Deployed Date: 9/13/2014				
Recovered Location: (Recovered Location: 05-01.35S/139 54.11W				
Sensors/Equipment Lost at Sea: None					
Sensors Damaged/Fouled: None					
Fishing/Vandalism: None					
Sensors/Tubes Downloaded: Sent to Lab for download					
Site Sensor Failures Date Data Flagged Why Data Flagged Field Service					

		Observations
None		

Buoy Site: 5S 140W	Mooring Depth: 4352 m			
Mooring Operation: Deployment	Mooring ID#: DM126A			
Deployed Location: 05-00.9S/139 55.1W	Deployed Date: 3/26/2015			
Pre-Deployment On Deck Instrument Failures: None				
Sensors/Equipment Lost at Sea: None				
Sensors Damaged During Deployment: None				
General Comments: None				

2.2 <u>CTD Casts Completed</u>

A Sea-Bird 911plus CTD with dual temperature and conductivity sensors was provided by the OMAO. Temperature and conductivity sensors are calibrated yearly at Sea-Bird and sent in for diagnostics as necessary.

The following outlines the CTD casts completed during the cruise:

CTD Operations				
Coordinates	LAT/LONG	Date	Cast #	Comments
0801.7984N	12501.9114W	3/5/2015	RB20011	3000 m
0700.3399N	12459.3326W	3/6/2015	RB20021	1000 m
0559.9446N	12457.6119W	3/6/2015	RB20031	1000 m
0505.6028N	12456.1180W	3/7/2015	RB20041	1000 m
0400.2431N	12459.3499W	3/7/2015	RB20051	1000 m
0300.0295N	12501.8981W	3/7/2015	RB20061	1000 m
0158.0173N	12504.3302W	3/8/2015	RB20071	1000 m
0100.0379N	12445.2601W	3/8/2015	RB20081	1000 m
0010.0434S	12423.9441W	3/9/2015	RB20091	3000 m
0100.0569S	12435.7426W	3/9/2015	RB20101	1000 m
0203.0435S	12455.2582W	3/10/2015	RB20111	1000 m
0259.7541S	12454.2957W	3/11/2015	RB20121	1000 m
0359.9812S	12454.5739W	3/11/2015	RB20131	1000 m
0500.8880S	12455.4331W	3/11/2015	RB20141	1000 m
0559.9076S	12456.0154W	3/12/2015	RB20151	1000 m
0659.9111S	12457.4569W	3/12/2015	RB20161	1000 m
0758.1010S	12458.7555W	3/12/2015	RB20171	3000 m
0858.1785N	14016.2086W	3/18/2015	RB20181	3000 m
0800.3363N	14011.1817W	3/19/2015	RB20191	1000 m
0659.9944N	14007.6140W	3/19/2015	RB20201	1000 m

0600.0831N	14003.7914W	3/19/2015	RB20211	1000 m
0450.2800N	13956.2664W	3/20/2015	RB20221	1000 m
0400.1286N	14000.4454W	3/21/2015	RB20231	1000 m
0300.0138N	14001.4409W	3/21/2015	RB20241	1000 m
0159.4697N	14001.0030W	3/22/2015	RB20251	1000 m
0100.2827N	13958.4434W	3/22/2015	RB20261	1000 m
0001.3474N	13955.7109W	3/23/2015	RB20271	1000 m
0100.0235S	14001.4411W	3/24/2015	RB20281	1000 m
0201.5030S	14000.3993W	3/24/2015	RB20291	1000 m
0259.7253S	13958.1974W	3/25/2015	RB20301	1000 m
0359.9621S	13955.7764W	3/25/2015	RB20311	1000 m
0501.8848S	13954.8932W	3/26/2015	RB20321	3000 m

2.3 Ancillary Science Projects Completed on the Cruise

The following outlines the ancillary science work performed in conjunction with the TAO operations on the cruise:

Pacific Marine Environmental Laboratory (PMEL) Argo Profiling CTD Floats

Ten (10) Argo floats were scheduled for deployment on this cruise. All Argo Float deployments were completed as scheduled.

Questions concerning ARGO Floats should be directed to:

Gregory Johnson, NOAA/PMEL or Elizabeth Steffen, NOAA/PMEL

Tel: (206) 526-6806 Tel: (206) 526-6747

E-mail: pmel_floats@noaa.gov E-mail: pmel_floats@noaa.gov

The following outlines the Argo floats deployed during the cruise:

ARGO Floats				
Coordinates	LAT/LONG	Date	SN#	Comments
2018.7612N	12129.3820W	3/2/2015	469	
0504.7264N	12456.8801W	3/7/2015	446	
0157.8555N	12505.1909W	3/8/2015	445	
0010.0941S	12423.2325W	3/9/2015	444	
0203.5928S	12455.7677W	3/10/2015	447	
0500.7576N	13958.5432W	3/20/2015	450	
0151.6587N	14001.8736W	3/22/2015	449	
0001.0558N	14001.7308W	3/24/2015	448	
0202.0072S	14001.2339W	3/25/2015	451	
1029.8148S	14300.7382W	3/27/2015	452	

Atlantic Oceanographic and Meteorological Laboratory (AMOL) Surface Drifting Floats

Twenty (20) AOML Surface Drifters were scheduled for deployment on this cruise. The chief scientist verified and briefed the Operations Officer on the deployment positions prior to the start of the cruise. All AOML Surface Drifter deployments were completed as scheduled.

Questions concerning AOML Surface Drifters should be directed to:

Shaun Dolk, NOAA/AOML Global Drifter Center,

Tel: (305) 361-4546 Fax: (305) 361-4436

E-mail: shaun.dolk@noaa.gov

The following outlines the AOML Drifting floats deployed during this cruise:

AOML Floats				
Coordinates LAT/LONG		Date	SN#	Comments
0504.6942N	12456.8042W	3/7/2015	62410680 & 62410690	NONE
0157.8567N	12505.1880W	3/8/2015	62410640 & 62410670	NONE
0203.5954S	12455.7691W	3/10/2015	115031 & 62410660	NONE
0500.8389S	12455.4467W	3/11/2015	1139487 & 139493	NONE
0500.7761N	13958.5441W	3/20/2015	139483 & 139495	NONE
			115023 & 115025 &	
0151.6639N	14001.8738W	3/22/2015	115024	NONE
			115022 & 115015 &	
0001.0667N	14001.7307W	3/24/2015	115018	NONE
0202.0056S	14001.2341W	3/25/2015	115019 &115021	NONE
0501.0438S	13955.6960W	3/26/2015	115026 & 115020	NONE